

CLAIMS

What is claimed is:

- 1 1. A soil biocide formulation for aqueous application comprising in combination:  
 2 an effective amount of a soil biocide selected from the group consisting of methyl  
 3 bromide, chloropicrin, 1-3 dichloropropene and methylisothiocyanate; and  
 4 an emulsifier.
  
- 1 2. The biocide formulation as recited in claim 1, wherein said emulsifier comprises a non-  
 2 ionic surfactant.
  
- 1 3. The biocide formulation as recited in claim 1, wherein said emulsifier comprises an  
 2 anionic surfactant.
  
- 1 4. The biocide formulation as recited in claim 1,  
 2 wherein said biocide is present in a range of approximately 50 to 99% by weight of the  
 3 biocide formulation; and  
 4 wherein said emulsifier is present in a range of approximately 50 to 1% by weight of the  
 5 biocide formulation.
  
- 1 5. The biocide formulation as recited in claim 4, wherein said emulsifier is comprised of  
 2 non-ionic and anionic surfactants.
  
- 1 6. The biocide formulation as recited in claim 1, wherein said soil biocide is present in the  
 2 range of approximately 80 to 95% by weight of the biocide formulation; and

3           said emulsifier is present in the range of approximately 20 to 5% by weight of the biocide  
4 formulation.

1    7.     The biocide formulation as recited in claim 6, wherein said emulsifier is comprised of  
2 non-ionic and anionic surfactants.

1    8.     The biocide formulation as recited in claim 7, wherein the anionic surfactant is present in  
2 an amount of from approximately 0.1 to 40% of the total weight of said surfactant, and wherein  
3 the non-ionic surfactant is present in an amount of from approximately 60 to 99.9% of the total  
4 weight of said surfactant.

1    9.     The biocide formulation as recited in claim 8, wherein the anionic surfactant is present in  
2 an amount of from approximately 0.1 to 30% of the total weight of said surfactant, and wherein  
3 the non-ionic surfactant is present in an amount of from approximately 70 to 99.9% of the total  
4 weight of said surfactant.

1    10.    A soil biocide formulation as for aqueous application comprising in combination:  
2           a soil biocide selected from the group consisting of methyl bromide, chloropicrin, 1-3  
3 dichloropropene and methylisothiocyanate, wherein the biocide is present in the range of  
4 approximately 80 to 95% by weight of the biocide formulation; and an emulsifier in the range of  
5 approximately 20 to 5% by weight of the biocide formulation, wherein the emulsifier is a non-  
6 ionic surfactant.

1    11.    A soil biocide formulation as for aqueous application comprising in combination:

2 a soil biocide selected from the group consisting of methyl bromide, chloropicrin, 1-3  
 3 dichloropropene and methylisothiocyanate, wherein the biocide is present in the range of  
 4 approximately 80 to 95% by weight of the biocide formulation; and an emulsifier in the range of  
 5 approximately 20 to 5% by weight of the biocide formulation, wherein the emulsifier comprises  
 6 an anionic surfactant.

1 12. The biocide formulation as recited in claim 1, wherein the emulsifier is selected from the  
 2 group consisting of nonylphenol ethoxylate, isopropyl amine dodecyl benzene sulfonate,  
 3 octylphenoethoxylate, isoheptyl ethoxylate, tridecyl ethoxylate, Castor Oil ethoxylate, calcium  
 4 dodecyl benzene sulfonate, and sodium dodecyl benzene sulfonate.

1 13. The biocide formulation as recited in claim 1, wherein said biocide comprises 1,3  
 2 dichloropropene, having an application rate of the biocide of approximately 13-56 gal per acre.

1 14. The biocide formulation as recited in claim 1, wherein said biocide comprises  
 2 chloropicrin, having an application rate of the biocide of approximately 100-300 lbs per acre.

1 15. The biocide formulation as recited in claim 1, wherein said biocide comprises methyl  
 2 isothiocyanate, having an application rate of the biocide of approximately 7-100 lbs per acre.

1 16. The biocide formulation as recited in claim 1, wherein said biocide comprises methyl  
 2 bromide, having an application rate of the biocide of approximately 150-400 lbs per acre.

1 17. The biocide formulation as recited in claim 1, wherein said emulsifier is selected from the  
 2 group consisting of:

3 nonylphenol ethoxylate in an amount varying from approximately 50 to 90%;  
 4 castor oil ethoxylate in an amount varying from approximately 10 to 40%;  
 5 isopropyl amine dodecyl benzene sulfonate in an amount varying from approximately 0.1  
 6 to 10%; and  
 7 isopropyl alcohol in an amount varying from approximately 0.1 to 30% of the emulsifier.

1 18. A method for applying a soil biocide formulation to soil comprising:  
 2 adding to an aqueous medium an effective amount of a soil biocide selected from the  
 3 group consisting of methyl bromide, chloropicrin, 1-3 dichloropropene and  
 4 methylisothiocyanate, and an emulsifier; and  
 5 applying the resulting mixture to the soil.

1 19. The method as recited in claim 18, wherein said biocide is present in a range of  
 2 approximately 50 to 99% by weight of the biocide formulation; and said emulsifier is present in a  
 3 range of approximately 50 to 1% by weight of the biocide formulation.

1 20. The method as recited in claim 18, wherein said emulsifier is comprised of non-ionic and  
 2 anionic surfactants.

1 21. The method as recited in claim 18, wherein said biocide is present in said formulation in  
 2 the range of approximately 80 to 95% by weight; and said emulsifier is present in said  
 3 formulation in the range of approximately 20 to 5% by weight.

1 22. The method as recited in claim 18, wherein said biocide is present in said formulation in  
2 the preferred range of approximately 90-95% by weight; and said emulsifier is present in said  
3 formulation in the range of approximately 5-10% by weight.

1 23. The method as recited in claim 20, wherein said anionic surfactant is present in said  
2 surfactant in the range of approximately 0.1 to 40% by weight.

1 24. The method as recited in claim 20, wherein the anionic surfactant is selected from the  
2 group consisting of Isopropyl amine Dodecyl Benzene Sulfonate, Dodecyl Benzene Sulfonate,  
3 and Sodium Dodecyl Benzene Sulfonate.

1 25. The method as recited in claim 20, wherein the non-ionic surfactant is selected from the  
2 group consisting of Tridecyl Ethoxylate, Castor Oil Ethoxylate, nonylphenol ethoxylate, Octyl  
3 phenol ethoxylate and Isoheptyl Ethoxylate.

1 26. The method as recited in claim 20, wherein said non-ionic surfactant is present in said  
2 emulsifier in the range of approximately 70 to 100% by weight of the emulsifier.

1 27. The method as recited in claim 18, wherein said biocide comprises 1,3 Dichloropropene,  
2 having an application rate of approximately 13-56 gal per acre.

1 28. The method as recited in claim 18, wherein said biocide comprises chloropicrin having an  
2 application rate of approximately 100-300 lbs per acre.

1 29. The method as recited in claim 18, wherein said biocide comprises methylisothiocyanate  
2 having an application rate of approximately 7-100 lbs. per acre.

1 30. The method as recited in claim 18, wherein said biocide comprises methyl bromide  
2 having an application rate of approximately 150-400 lbs. per acre.

1 31. The method as recited in claim 18, wherein said emulsifier is comprised of:  
2 nonphenol ethoxylate in an amount from approximately 50 to 90%;  
3 castor oil ethoxylate in an amount from approximately 10 to 40%;  
4 isopropyl amine dodecyl benzene sulfonate in an amount from approximately 0.1 to 10%;  
5 and  
6 isopropyl alcohol in an amount from approximately 0.1 to 30%.

1 32. A method for fumigating soil, said method comprising the steps of:  
2 adding to an aqueous medium an effective amount of a soil biocide selected from the  
3 group consisting of methyl bromide, chloropicrin, 1-3 dichloropropene and  
4 methylisothiocyanate, and an emulsifier; and  
5 applying the resulting mixture to the soil in a drip irrigation system.